MAGNETIC-CONTROLLED HYBRID PHOTOCATALYST FOR ENVIRONMENTAL REMEDIATION - SWEDHA MADHU

Water, covering 71% of Earth's surface, is essential for life, yet industrial activities have severely polluted freshwater with hazardous contaminants. These pollutants pose serious health risks over time, affecting organs like the lungs, liver, and brain. Photocatalysis has emerged as a promising solution due to its high efficiency, reusability, and cost-effectiveness, enabling the complete breakdown of pollutants. Colloidal Quantum Dots (QDs), which are semiconductor nanocrystals smaller than 20 nm, exhibit unique optical and electronic properties influenced by their size, shape, and composition. By integrating QDs with two-dimensional materials, innovative hybrid photocatalysts are fabricated to achieve effective pollutant mineralization. These catalysts will be developed as thin films, minimizing material use and costs while allowing easier recovery compared to traditional powdered nanomaterials. This novel and efficient wastewater treatment strategy can be employed as a tool for the real-time treatment of pesticide residues from freshwater resources, significantly contributing to Canada’s commitment to the United Nations’ two sustainability development goals (SDGs) (6: Clean water sanitation and 15: Life on land).